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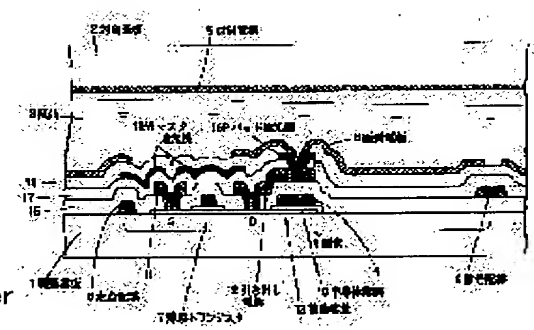
(54) ACTIVE MATRIX TYPE DISPLAY DEVICE

(57)Abstract:

PURPOSE: To impart an electric shielding function and electric contact function to light shielding films formed on a driving substrate side.

CONSTITUTION: This active matrix type display device includes a driving substrate 1 having pixels 4, a counter substrate 2 having counter electrodes 5 and liquid crystals 3 held in a spacing between both. The upper layer part of this driving substrate 1 includes pixel electrodes 6 formed at every pixel 4. The lower layer part includes thin-film transistors (TFTs) 7 for driving the individual pixel electrodes 6, scanning wirings 8 and signal wirings 9. Light shielding films having electrical conductivity are interposed between the upper layer part and the lower layer part and are separated to the mask light shielding films 16M and pad light shielding films 16P. The mask light shielding films 16M are continuously patterned along the row direction of the pixels 4 to at least partly shield the light of the TFTs 7, are insulated from the upper layer part and lower layer part and are held at fixed potential. The pad light shielding films 16P are discretely patterned for every pixel 4 and are interposed into the contact parts C between the corresponding pixel electrodes 6 and the TFTs 7, thereby providing the electrical connection and light shielding thereof.



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CLAIMS

[Claim(s)]
[Claim 1] The drive substrate which has the pixel which carried out matrix arrangement The opposite substrate which has a counterelectrode and was joined to this drive substrate through the predetermined gap, and the electrooptic material held in this gap It is the active-matrix type display equipped with the above. the aforementioned drive substrate The management containing the pixel electrode formed for every pixel, and the switching element which drives each pixel electrode, The lower layer section including the signal wiring which supplies a predetermined signal to the train of this switching element corresponding to each train of the scanning wiring which scans the line of this switching element corresponding to each line of a pixel, and a pixel, It has the shading film which has the conductivity which intervened between this management and the lower layer section, and was divided into a predetermined mask field and a predetermined pad field. While patterning of the aforementioned mask field is continuously carried out along with the line writing direction of a pixel, and it shades a switching element partially at least, and it insulates from this management and the lower layer section and it is held at fixed potential The aforementioned pad field is characterized by being placed between the contact section between the pixel electrodes and switching elements which patterning is dispersedly carried out for every pixel, and correspond, and aiming at the electrical installation and shading.
[Claim 2] The aforementioned shading film is active-matrix type display according to claim 1 characterized by intersecting the signal wiring which patterning formation is carried out at scanning wiring and parallel, and has shading nature, constituting a grid-like black matrix, shading the circumference of each pixel electrode, and specifying opening of a pixel.
[Claim 3] The aforementioned shading film is active-matrix type display according to claim 2 characterized by reduction-izing area which has the notching pattern to the part which intersects signal wiring, and laps with this signal wiring.
[Claim 4] The aforementioned switching element is active-matrix type display according to claim 1 characterized by shading between the pad fields which this drawer electrode has shading nature while pulling out, having the electrode and carrying out electrical connection to a pixel electrode through the pad field of a shading film, and were separated mutually and mask fields which were formed in the same layer as signal wiring.
[Claim 5] The aforementioned mask field is active-matrix type display according to claim 1 characterized by being held at fixed potential equal to the potential of a counterelectrode.
[Claim 6] The shading film which has the aforementioned conductivity is active-matrix type display according to claim 1 characterized by being a metal membrane.
[Claim 7] The aforementioned switching element is active-matrix type display according to claim 1 characterized by being TFT.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the active-matrix type display which consists of liquid crystal held between a drive substrate, an opposite substrate, and both. It is related with the so-called on-chip black structure which formed the black matrix for shading in the drive substrate side in addition to the pixel electrode and the switching element in more detail.
[0002]
[Description of the Prior Art] The liquid crystal display is briskly used for television, graphic display, etc. Also in it, especially an active-matrix type liquid crystal display has high-speed responsibility, and fits high pixel number-ization, it is expected as what realizes high-definition-izing of a display screen, enlargement, colorization, etc., and there are some which research and development were furthered and were already put in practical use. This active-matrix type display is prepared so that scanning wiring and signal wiring may be intersected perpendicularly with a drive substrate side, and it arranges a switching element and a pixel electrode for every intersection of the, respectively. On the other hand, in addition to the counterelectrode, the black matrix is usually formed in the opposite substrate side. This black matrix intercepted the leakage light which passes through the gap of the pixel electrode which carried out matrix arrangement, and has prevented the fall of a contrast ratio while it intercepts the light which carries out incidence to a switching element and protects the malfunction of the switching element by the photocurrent from the exterior. However, if a black matrix is prepared in an opposite substrate side, alignment by the side of a drive substrate must be performed precisely, and it has become a burden on assembly processing. The method of arranging a black matrix so that each pixel electrode may be overlapped to some extent as a cure of such an alignment gap is usually adopted. If it is made this appearance, the size of an overlap portion can absorb the alignment error at the time of joining a drive substrate and an opposite substrate. However, if an overlap portion is prepared, the effective-area product to the pixel electrode of the part black matrix will be reduction-ized, a numerical aperture falls victim, and the brightness of a pixel falls.
[0003]
[Problem(s) to be Solved by the Invention] Thus, there is a problem of the position gap produced in case it combines a drive substrate and an opposite substrate, in arranging a black matrix in an opposite substrate side. Then, the so-called on-chip black structure which makes a black matrix to a drive substrate side is proposed. On the same substrate, the alignment precision of a pixel electrode and a black matrix is realizable to about 1 micrometer. This on-chip black structure is indicated by JP,5-181159,A, and is briefly explained with reference to drawing 3 . Structure is formed conventionally [this] considering the insulating substrate 100 which consists of a quartz etc. as the base so that it may illustrate. The signal wiring 105 which becomes order from the two-layer structure of the semiconductor thin films 101, such as polycrystal silicon, the gate insulator layer 102, the gate electrode 103 that consists of polycrystal silicon formed into low resistance, the layer insulation film 104, aluminum, and chromium from a lower layer, and SiNx a shell -- the shading film 107 which consists of metals or those silicide, such as the layer insulation film 106, titanium, and a tungsten, and SiNx from -- the pixel electrode 109 which consists of the becoming protective coat 108 and a transparent electric conduction film like ITO has piled up In addition, electrical

connection of the signal wiring 105 is carried out to the source field 111 of TFT 110, and, similarly electrical connection of the pixel electrode 107 is carried out to the drain field 112 of TFT 110.
[0004] As for this conventional example, TFT 110 and signal wiring 105 constitute the lower layer section, and the pixel electrode 109 constitutes a management. The shading film 107 intervenes between these managements and the lower layer section, and a black matrix is constituted. This black matrix consists of a metal membrane etc., and is electrically insulated from a management and the lower layer section with the layer insulation film. However, this shading film 107 forms the parasitic capacitance between the signal wiring 105 of the pixel electrode 109 of a management, or the lower layer section. In this case, since the shading film 107 is in a floating potential state, capacity distributor shaft coupling arises and the technical problem that display quality is spoiled occurs. Moreover, the pixel electrode 109 of a management penetrates the shading film 107 of the medium-rise section, and electrical connection is carried out to the drain field 112 of TFT 110 of the lower layer section. Since the shading film 107 is removed in part in this contact section, perfect shading has the technical problem that it is difficult and optical leakage arises in part. Moreover, when the direct file of the drain field 112 is carried out to the pixel electrode 109 which consists of ITO etc., a good ohmic contact is not obtained but the technical problem that it is the cause of a pixel defect occurs.
[0005] In addition, although the conventional example mentioned above is the structure of preparing a shading film between a management and the lower layer section, the composition which formed the shading film in the lowest layer is also known, for example, it is indicated by JP,4-331923,A. This composition uses amorphous silicon TFT as a switching element, and is in use now. However, now, in order to form TFT after shading film formation, property change of a layer short or TFT arises. in order to prevent this -- a shading film -- a part -- not removing -- it does not obtain but full shading is difficult Moreover, when polycrystal silicon TFT is used as a switching element, since an elevated-temperature process is unescapable, the structure of preparing a shading film cannot be adopted as the lowest layer in fact after shading film formation. Moreover, the structure of preparing a shading film in the best layer is also proposed. However, it is difficult for the pixel electrode to exist in the front face of a drive substrate, and to secure a predetermined margin between shading films. If reverse stagger structure is adopted as TFT, the pixel electrode of the lower layer section will become unreserved on a front face. Moreover, a pixel electrode becomes it unreserved on a front face that it is the coplanar structure of polycrystal silicon TFT. The structure of being after TFT formation as this improvement version, and preparing a shading film before pixel electrode formation is also proposed. In this case, it becomes the composition which the shading film connected with the pixel electrode electrically. However, now, the potential of a pixel electrode is sharply changed by distributor shaft coupling. In order to prevent this, a part of shading film must be removed, and perfect shading becomes difficult.
[0006]
[Means for Solving the Problem] in view of the technical problem of a Prior art mentioned above, perfect shading is possible for this invention, and the bad influence by capacity distributor shaft coupling does not arise, but the active-matrix type display with which the electrical connection of a pixel electrode and a switching element has good on-chip black structure is offered -- it aims at things The following meanses were provided in order to attain this purpose. That is, the active-matrix type display concerning this invention is equipped with the drive substrate which has the pixel which carried out matrix arrangement as fundamental composition, the opposite substrate which has a counterelectrode and was joined to this drive substrate through the predetermined gap, and the electrooptic material held in this gap. With the management containing the pixel electrode in which the aforementioned drive substrate was formed for every pixel The lower layer section including the signal wiring which supplies a predetermined signal to the train of this switching element corresponding to each train of scanning wiring or a pixel which scans the line of this switching element corresponding to each line of a switching element or a pixel which drives each pixel electrode, It has the shading film which has the conductivity which intervened between this management and the lower layer section, and was divided into a predetermined mask field and a predetermined pad field. It insulates from this management and the lower layer section, and it is held at

fixed potential while patterning of the shading film (following mask shading film) formed in the aforementioned mask field is continuously carried out along with the line writing direction of a pixel and it shades a switching element partially at least. On the other hand, it is placed between the contact sections between the pixel electrodes and switching elements which patterning is dispersedly carried out for every pixel, and correspond by the shading film (following pad shading film) formed in the aforementioned pad field, and it aims at the electrical installation and shading.
[0007] Preferably, the aforementioned shading film intersected the signal wiring which patterning formation is carried out at scanning wiring and parallel, and has shading nature, constituted the grid-like black matrix, shaded the circumference of each pixel electrode, and has specified opening of a pixel. Moreover, preferably, the aforementioned shading film has the notching pattern to the part which intersects signal wiring, and reduction-izes area which laps with this signal wiring. The aforementioned switching element is shading still more preferably between the pad shading films which this drawer electrode has shading nature and were separated while pulling out, having the electrode and carrying out electrical connection to a pixel electrode through this pad shading film and mask shading films which were formed in the same layer as signal wiring. The aforementioned mask shading film is held at fixed potential equal to the potential of a counterelectrode. The shading film which has the aforementioned conductivity consists of a metal membrane. The aforementioned switching element consists of TFT.
[0008]
[Function] According to this invention, the shading film intervenes between the lower layer sections including the management and TFT containing a pixel electrode etc., or wiring. This shading film is completely insulated from a management and the lower layer section electrically with the layer insulation film. The shading film is divided into the mask shading film and the pad shading film. While the mask shading film is held at the fixed potential of a counterelectrode and this potential and playing the role of an electric shield to a pixel electrode, it is possible to suppress capacity distributor shaft coupling between wiring. It is placed between the contact sections between a pixel electrode and a switching element by the pad shading film, and it makes both electrical installation good. The drawer electrode which carries out a direct file to a switching element was specifically prepared, and this and the pixel electrode have connected mutually through a pad shading film. This drawer electrode is adjusted in the crevice between a mask shading film and a pad shading film, and since patterning formation is carried out, perfect shading structure is acquired. On the other hand, patterning of the signal wiring is carried out along the direction of a train, and a grid-like black matrix can form it in a drive substrate by combining both by whom patterning is done for a shading film along with a line writing direction and who intersected perpendicularly mutually. Therefore, perfect on-chip black matrix structure is acquired.
[0009]
[Example] With reference to a drawing, the suitable example of this invention is explained in detail below. Drawing 1 is the typical fragmentary sectional view showing one example of the active-matrix type display concerning this invention. This active-matrix type display has the panel structure which consisted of electrooptic materials which consist of liquid crystal 3 grade held between the drive substrate 1, the opposite substrate 2, and both so that it may illustrate. The drive substrate 1 has the pixel 4 which carried out matrix arrangement. The opposite substrate 2 has the counterelectrode 5 at least, and has joined it to the drive substrate 1 through a predetermined gap. Liquid crystal 3 is held in this gap.
[0010] The drive substrate 1 is divided into a management, the medium-rise section, and the lower layer section. A management contains the pixel electrode 6 formed every pixel 4. On the other hand, the lower layer section includes the signal wiring 9 which supplies a predetermined picture signal to the train of TFT 7 corresponding to each train of the scanning wiring 8 which scans the line of TFT 7 corresponding to each line of 7 pixel TFT 4 as a switching element which drives each pixel electrode 6, and a pixel 4. In addition, TFT 7 makes the barrier layer the semiconductor thin film 10 which consists of polycrystal silicon etc., and patterning formation of the gate electrode G is carried out through the gate insulator layer on it. This gate electrode G is following the scanning wiring 8 mentioned above. TFT 7 equips the both sides of the gate electrode G with the source field S and the drain field D. One drawer electrode 11 has connected with the

source field·S side, and the signal wiring 9 mentioned above is followed. The drawer electrode 12 of another side has connected with the drain field D. In addition, in addition to TFT 7 mentioned above, the auxiliary capacity 13 is also formed in the semiconductor thin film 10. This auxiliary capacity 13 uses the semiconductor thin film 10 as one electrode, and uses auxiliary wiring 14 as the electrode of another side. The gate insulator layer and the dielectric film of this layer intervene among two electrodes 10 and 14. In addition, the gate electrode G, the scanning wiring 8, and the auxiliary wiring 14 consist of the same layer, and are electrically insulated from the drawer electrodes 11 and 12 by the insulator layer 15 between the 1st layer.
[0011] It is placed between the medium-rise sections between the managements and the lower layer sections which were mentioned above by the shading film which has conductivity. This shading film is divided into the mask field and the pad field. That is, this shading film is divided into mask shading film 16M and pad shading film 16P. The shading films 16M and 16P which have such conductivity consist of a metal membrane. Along with the line writing direction of a pixel, patterning of one mask shading film 16M is carried out continuously, and they shade TFT 7 partially at least. Between the 2nd layer, mask shading film 16M are pinched from the upper and lower sides by the insulator layer 17 and the insulator layer 18 between the 3rd layer, and are insulated from the lower layer section and the management which mentioned above. Mask shading film 16M are held at fixed potential. This fixed potential is set up equally to the potential of a counterelectrode 5. On the other hand, patterning of pad shading film 16P is carried out dispersedly every pixel 4. It is placed between the contact sections C between corresponding pixel electrodes 6 and TFT 7 by pad shading film 16P, and they aim at the electrical installation and shading. Specifically, pad shading film 16P pull out with the pixel electrode 6, intervene between electrodes 12, and make both electrical installation good. In addition, this drawer electrode 12 is formed in the same layer as signal wiring 9, as mentioned above, and it is carrying out direct electrical connection to the drain field D of TFT 7. This drawer electrode 12 is shading between pad shading film 16P which have shading nature and were separated mutually, and mask shading film 16M.
[0012] Drawing 2 is the typical plan of the active-matrix type display shown in drawing 1 , and expands and expresses one pixel portion. Patterning formation of mask shading film 16M is carried out in parallel with the scanning wiring 8 so that it may illustrate. Therefore, mask shading film 16M intersect the signal wiring 9 which has shading nature, and constitute a grid-like black matrix. Thereby, the circumference of each pixel electrode 6 is shaded and the opening 19 of a pixel is specified. Under the present circumstances, mask shading film 16M have the notching pattern 20 to the part which intersects signal wiring 9, and have reduction-ized area which laps with signal wiring 9 as much as possible. Thereby, the bad influence of capacity distributor shaft coupling can be suppressed. In addition, in the portion of this notching pattern 20, only mask shading film 16M and about 0.1-2.0 micrometers of signal wiring 9 have not lapped. As mentioned above, TFT 7 has the drawer electrode 12 formed in the same layer as signal wiring 9, and touches the drain field D directly. Electrical connection of this drawer electrode 12 is carried out to the upper pixel electrode 6 through pad shading film 16P. It is placed between the contact sections C between the pixel electrode 6 and TFT 7 by pad shading film 16P if it puts in another way. The drawer electrode 12 also has shading nature and between pad shading film 16P separated mutually and mask shading film 16M is shaded. In addition, patterning of the auxiliary wiring 14 shown in drawing 1 is carried out in parallel with the scanning wiring 8. A part of auxiliary wiring 14 overlaps the semiconductor thin film 10, and it forms the auxiliary capacity mentioned above.
[0013] As explained above, from the switching element which consists of TFT 7 grade, signal wiring 9, and the scanning wiring 8 grade, the conductive shading films 16M and 16P are the upper parts, and are formed more nearly caudad than the pixel electrode 6. Since any of signal wiring 9, the scanning wiring 8, and the pixel electrode 6 are insulated, these shading films 16M and 16P can shade all the fields that should be carried out a mask in the minimum area. For this reason, it is possible for full shading of a viewing area to be attained only by the drive substrate 1 side, and to raise the permeability as active-matrix type display to the maximum. Moreover, since the opposite substrate 2 should form only a counterelectrode 5, it can also mitigate the cost of materials and assembly expense. Furthermore, capacity distributor shaft coupling

can be suppressed and they can raise display quality while they play the role of a shield to each pixel electrode 6, since mask shading film 16M are held at fixed potential. On the other hand, pad shading film 16P pull out with the pixel electrode 6, intervene between electrodes 12, and make both electrical connection good.

[0014] With reference to drawing 1 and drawing 2 , the manufacture method of the active-matrix type display concerning this invention is explained in detail succeedingly. The drive substrate 1 consists of glass or a quartz, and forms the semiconductor thin film 10 by reduced pressure CVD on this drive substrate 1. For example, this semiconductor thin film 10 consists of polycrystal silicon deposited on about 50nm thickness, and is used as a barrier layer of TFT 7. Patterning of this semiconductor thin film 10 is carried out to the shape of a formed back island. the semiconductor thin film 10 top -- for example, SiO2 from -- the becoming gate insulator layer is formed Here, as a material of the semiconductor thin film 10, you may use amorphous silicon etc. other than polycrystal silicon. Moreover, as a material of a gate insulator layer, it is SiO2. You may use SiN, tantalum oxide, these cascade screens, etc. for others.

[0015] Next, the scanning wiring 8, the gate electrode G, and auxiliary wiring 14 grade are simultaneously formed on the drive substrate 1. For example, after depositing polycrystal silicon in about 350nm thickness by reduced pressure CVD, an impurity is doped, low resistance-ization is attained and patterning is carried out to a further predetermined configuration. As a material of these scanning wiring 8, the gate electrode G, and the auxiliary wiring 14, you may use metals, such as Ta, Mo, aluminum, and Cr, those silicide, a polycide, etc. other than polycrystal silicon. Thus, TFT 7 which consists of the semiconductor thin film 10, a gate insulator layer, and a gate electrode G is formed. In this example, although this TFT 7 is a planar type, you may adopt a right stagger type, a reverse stagger type, etc. Simultaneously, the auxiliary capacity 13 is also formed in the semiconductor thin film 10.

[0016] Next, PSG etc. is deposited in about 600nm thickness by ordinary-pressure CVD, and an insulator layer 15 is formed between the 1st layer. The insulator layer 15 has covered the scanning wiring 8, the gate electrode G, and auxiliary wiring 14 grade which were mentioned above between this 1st layer. Opening of the contact hole which arrives at the source field S and the drain field D of TFT 7 is carried out to the insulator layer 15 between this 1st layer. On the insulator layer 15, patterning formation of signal wiring 9 or the drawer electrodes 11 and 12 is carried out between the 1st layer. For example, aluminum is deposited in about 600nm thickness by the sputtering method, patterning is carried out to a predetermined configuration, and it is processed into signal wiring 9 and the drawer electrodes 11 and 12. It connects with the source field S of TFT 7 through a contact hole, and, similarly one drawer electrode 11 connects the drawer electrode 12 of another side to the drain field D of TFT 7 through a contact hole. As a material of these signal wiring 9 and the drawer electrodes 11 and 12, you may use Ta, Cr, Mo, nickel, etc. other than aluminum.

[0017] On signal wiring 9 or the drawer electrodes 11 and 12, the insulator layer 17 is formed between the 2nd layer, and these are covered. For example, PSG is deposited in about 600nm thickness by ordinary-pressure CVD, and an insulator layer 17 is formed between the 2nd layer. Opening of the contact hole (C) which pulls out to an insulator layer 17 between this 2nd layer, and reaches an electrode 12 is carried out. On the insulator layer 17, mask shading film 16M and pad shading film 16P are formed between this 2nd layer. For example, Ti is deposited in about 250nm thickness by the sputtering method, patterning is carried out to a predetermined configuration, and it is processed into mask shading film 16M and pad shading film 16P. Mask shading film 16M are in contact with fixed potential in the field besides a display pixel. On the other hand, pad shading film 16P are pulled out through the contact hole (C) mentioned above, and are in contact with the electrode 12. Mask shading film 16M are crossed to all display pixel fields, and are connected mutually. Mask shading film 16M have covered almost all the fields of TFT 7, the scanning wiring 8, and the auxiliary wiring 14 except for the pixel opening 19 and signal wiring 9. For this reason, the side of a couple where each pixel opening 19 counters mutually is prescribed by signal wiring 9, and the side of other couples is specified by mask shading film 16M. What is necessary is just the material which has sufficient shading nature and good level difference covering nature as mask shading film 16M. Shading nature should just be 0.1% or less preferably 1% or less of permeability in a 400-700nm light field. As a

material of mask shading film 16M, you may use metals, and these alloys and silicide other than Ti, such as Cr, nickel, Ta, W, aluminum, Cu, Mo, Pt, and Pd. Generally the thickness of mask shading film 16M should just be 50nm or more that what is necessary is just the thickness with which are satisfied of the shading nature mentioned above by each material. In addition, pad shading film 16P are completely formed in the same layer with mask shading film 16M.

[0018] An insulator layer 18 is formed between the 3rd layer so that mask shading film 16M and pad shading film 16P may be covered. For example, PSG is deposited in about 600nm thickness by ordinary-pressure CVD, and an insulator layer 18 is formed between the 3rd layer. The contact hole which amounts to pad shading film 16P is carrying out opening to the insulator layer 18 between this 3rd layer. In addition, you may use SiO2, BSG, BPSG, SiN, Plasma SiN, etc. and the polyimide and the organic substance like acrylic resin other than PSG that what is necessary is just transparency and an insulating thing as a material of the layer insulation films 15, 17, and 18. On the insulator layer 18, the pixel electrode 6 is formed between the 3rd layer. For example, transparent electric conduction films, such as ITO, are formed by about 150nm thickness by the sputtering method, patterning is carried out to a predetermined configuration, and it is processed into the pixel electrode 6.

[0019] Then, the opposite substrate 2 which consists of glass etc. and by which the counterelectrode 5 is formed in the whole surface is joined to the drive substrate 1. Liquid crystal 3 is enclosed with the gap of both the substrates 1 and 2. For example, twist nematic orientation of this liquid crystal 3 is carried out.

[0020] In addition, in the example mentioned above, although TFT 7 is used as a switching element, 2 terminal elements, such as diode, a varistor, and a metal-insulator-metal (MIM) element, can be used as a switching element in addition to 3 terminal elements, such as TFT. When using 2 terminal element, two or more matrix-like pixel electrodes, 2 terminal element, the 1st electrode group, etc. are prepared in the drive substrate 1 side, and the 2nd electrode group which intersects the 1st electrode group is prepared in the opposite substrate 2 side. In addition, in the example mentioned above, the pixel electrode 6 connected with the drain field D of TFT 7, and signal wiring 9 has connected with the source field S. However, since in fact carries out the alternating current drive of the liquid crystal 3, the source field S of TFT 7 and the drain field D exchanges [the role] by turns.

[0021]

[Effect of the Invention] According to this invention, the shading film is made to intervene between the management where a pixel electrode belongs, and the lower layer section to which TFT and wiring belong, as explained above. This shading film is divided into the mask shading film and the pad shading film. This mask shading film can suppress capacity distributor shaft coupling to wiring, and was able to raise display quality while it played the role of a shield to each pixel electrode, since it connected with fixed potential. On the other hand, a pad shading film intervenes between a pixel electrode and a switching element, and makes both electrical installation good. A mask shading film is located more nearly up than a switching element and wiring, and is caudad located from the pixel electrode. Since any of wiring or a pixel electrode are insulated, all the fields that should shade can be shaded in the minimum area. For this reason, it is possible for full shading of a viewing area to be attained only by the drive substrate side, and to raise the permeability as a liquid crystal display to the maximum. On the other hand, since what is necessary is to form only a counterelectrode in the opposite substrate 2 side, the cost of materials and assembly expense are also mitigable.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the typical fragmentary sectional view showing one example of the active-matrix type display concerning this invention.
[Drawing 2] It is the typical part plan showing one example of the active-matrix type display similarly applied to this invention.
[Drawing 3] It is the typical fragmentary sectional view showing an example of the conventional active-matrix type display.
[Description of Notations]
1 Drive Substrate
2 Opposite Substrate
3 Liquid Crystal
4 Pixel
5 Counterelectrode
6 Pixel Electrode
7 TFT
8 Scanning Wiring
9 Signal Wiring
10 Semiconductor Thin Film
12 Drawer Electrode
13 Auxiliary Capacity
15 Insulator Layer between 1st Layer
16M Mask shading film
16P Pad shading film
17 Insulator Layer between 2nd Layer
18 Insulator Layer between 3rd Layer
19 Opening
20 Notching Pattern

[Translation done.]